WHAT IS CLAIMED IS:

1. A method for forming a diffusion barrier layer comprising the steps of:

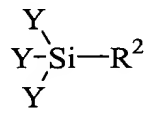
a) preparing a silicon substrate;

b) contacting the silicon substrate with a composition comprising self-assembled monolayer subunits and a solvent; and,

c) removing the solvent

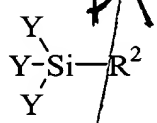
thereby forming the diffusion barrier.

2. The method according to claim 1, wherein the self-assembled monolayer subunit is of the following structure:



wherein Y is an O-alkyl group, and wherein R^2 is an alkyl group, heteroalkyl group, aryl group or heteroaryl group.

3. The method according to claim 1, wherein the self-assembled monolayer subunit is of the following structure:

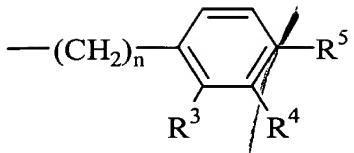


wherein Y is a halogen, and wherein R^2 is an alkyl group, heteroalkyl group, aryl group or heteroaryl group.

4. The method according to claim 1, wherein the silicon substrate preparation comprises the formation of a silicon oxide surface.

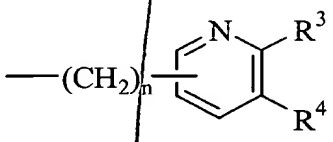
5. The method according to claim 1, wherein the method further comprises the step of heating the silicon substrate and the composition during contact.

6. The method according to claim 2, wherein R^2 is an alkyl group of the following structure:



wherein R^3, R^4 and R^5 are independently selected from the group consisting of hydrogen, alkyl groups, heteroalkyl groups, halo groups, NH_2, NHR^6, NR^6R^7, OH, OR^6, SH, SR^6, CHO, COOH and CN, and wherein R^6 and R^7 are alkyl groups, and wherein n is an integer ranging from 1 to 5.

7. The method according to claim 2, wherein R^2 is an alkyl group of the following structure:



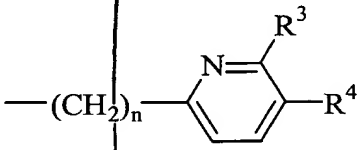
wherein R^3 and R^4 are independently selected from the group consisting of hydrogen, alkyl groups, heteroalkyl groups, halo groups, NH_2, NHR^6, NR^6R^7, OH, OR^6, SH, SR^6, CHO, COOH and CN, and wherein R^6 and R^7 are alkyl groups, and wherein n is an integer ranging from 1 to 5.

8. The method according to claim 6, wherein Y is OCH_3.

9. The method according to claim 7, wherein Y is OCH_3.

10. The method according to claim 8, wherein R^3, R^4 and R^5 are hydrogen and n is 2.

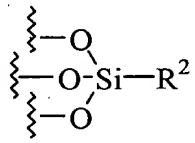
11. The method according to claim 9, wherein R^2 is an alkyl group of the following structure:



and wherein R^3 and R^4 are hydrogen and n is 2.

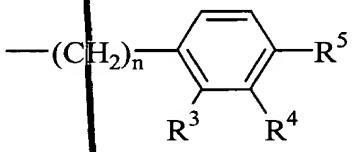
12. A diffusion barrier layer in an integrated circuit, wherein the diffusion barrier comprises a self-assembled monolayer.

13. The diffusion barrier according to claim 12, wherein the self-assembled monolayer comprises subunits, and wherein the subunits are of the following structure:



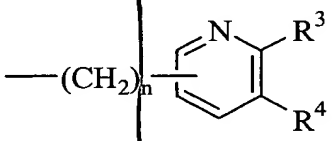
wherein R^2 is an alkyl group, heteroalkyl group, aryl group or heteroaryl group.

14. The diffusion barrier according to claim 13, wherein R^2 is an alkyl group of the following structure:



wherein R^3, R^4 and R^5 are independently selected from the group consisting of hydrogen, alkyl groups, heteroalkyl groups, halo groups, NH_2, NHR^6, NR^6R^7, OH, OR^6, SH, SR^6, CHO, COOH and CN, and wherein R^6 and R^7 are alkyl groups, and wherein n is an integer ranging from 1 to 5.

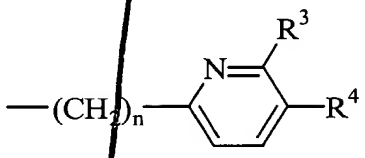
15. The diffusion barrier according to claim 13, wherein R^2 is an alkyl group of the following structure:



wherein R^3 and R^4 are independently selected from the group consisting of hydrogen, alkyl groups, heteroalkyl groups, halo groups, NH_2, NHR^6, NR^6R^7, OH, OR^6, SH, SR^6, CHO, COOH and CN, and wherein R^6 and R^7 are alkyl groups, and wherein n is an integer ranging from 1 to 5.

16. The diffusion barrier according to claim 14, wherein R^3, R^4 and R^5 are hydrogen and n is 2.

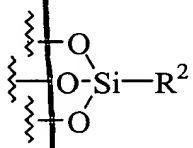
17. The diffusion barrier according to claim 15, wherein R^2 is an alkyl group of the following structure:



and wherein R^3 and R^4 are hydrogen and n is 2.

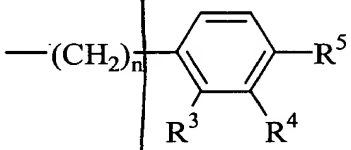
18. An integrated circuit comprising a silicon substrate, a diffusion barrier layer and a metal deposited on the diffusion barrier layer, wherein the diffusion barrier is covalently attached to the silicon substrate, and wherein the diffusion barrier is a self-assembled monolayer.

19. The integrated circuit according to claim 18, wherein the self-assembled monolayer comprises subunits of the following structure:



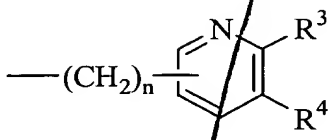
wherein R^2 is an alkyl group, heteroalkyl group, aryl group or heteroaryl group:

20. The integrated circuit according to claim 19, wherein R^2 is an alkyl group of the following structure:



wherein R^3, R^4 and R^5 are independently selected from the group consisting of hydrogen, alkyl groups, heteroalkyl groups, halo groups, NH_2, NHR^6, NR^6R^7, OH, OR^6, SH, SR^6, CHO, COOH and CN, and wherein R^6 and R^7 are alkyl groups, and wherein n is an integer ranging from 1 to 5.

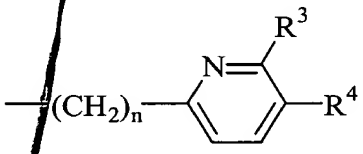
21. The integrated circuit according to claim 19, wherein R^2 is an alkyl group of the following structure:



wherein R^3 and R^4 are independently selected from the group consisting of hydrogen, alkyl groups, heteroalkyl groups, halo groups, NH_2, NHR^6, NR^6R^7, OH, OR^6, SH, SR^6, CHO, COOH and CN, and wherein R^6 and R^7 are alkyl groups, and wherein n is an integer ranging from 1 to 5.

22. The integrated circuit according to claim 20, wherein R^3, R^4 and R^5 are hydrogen and n is 2.

23. The integrated circuit according to claim 21, wherein R^2 is an alkyl group of the following structure:



and wherein R^3 and R^4 are hydrogen and n is 2.

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